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Some Language-Related Cognitive Advantages of Bilingual Five Year Olds.

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Fifteen bilingual and 15 monolingual Head Start children, ranging in age from 4 to 6, were administered three types of tasks: (1) object constancy task: subject was shown a common object, a transformation was done on the object, e.g., crushing a paper cup, and then that object plus an identical pre-transformed object, were shown to the subject and he was asked to pick out the first object; (2) naming task: subject was asked to use object labels under three conditions: use of the common name, use of a nonsense name, and use of switched common names; and (3) a sentence task: subject was required to use the three label conditions (2) in simple relational sentences. It was hypothesized that (I) bilinguals would perform better than monolinguals on all three tasks, and (II), that for all subjects, task (1) would be easier than (2) which would be easier than (3). Both hypotheses were supported by the gross data. It was found that bilinguals, although better at using names in relational statements, were not better than monolinguals in the use of common names alone nor nonsense names alone. Also, bilinguals performed consistently better than monolinguals where nonverbal pointing responses were required, but not where spoken responses were required. It was suggested that having a notion of meaning as a function of use facilitates acquisition of the ability of young children to use labels in sentences. (WD)

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SOME LANGUAGE-RELATED COGNITIVE ADVANTAGES OF BILINGUAL FIVE YEAR OLDS

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It was an accepted notion for many years that bilingual children had serious deficits in contrast with their monolingual peers (3). But recent research has shown that some bilingual children do not do worse than monolinguals on general measures of intellectual development (5). Fishman (4) argues that disadvantages commonly associated with bilingualism would not appear in bilinguals whose languages were situation specific. In fact one might expect that in some cognitive areas, the bilinguals' knowledge of two languages might be advantageous. In particular one might expect that functions related to labelling would be advanced by having two languages, for the child would thus be facilitated in his acquisition of a mature notion of the nature of labels.

Piaget (6) argues that object constancy must be established before the child can learn to use verbal labels as names for objects. And the ability to use labeles alone as names for objects ought to be a precursor to more elaborate cognitive skills involving the use of labels in sentences. Object constancy, naming, and the use of names in sentences ought to emerge in that order in development and the order ought to be apparent in the five year old child for whom object

constancy is almost an accomplished fact and for whom the use of sentences is just beginning to emerge. One might expect that all three of these skills would be better in bilingual than monolingual children.

Inasmuch as I expect this advantage to be apparent simply because the bilinguals have two languages, one might expect that the advantages of the middle class child (who, according to Bernstein (2), has two language codes) over the lower class child could be looked at in the same way. The middle class child is said to have both an elaborated and a restricted language code while the lower class child is said to have only a restricted code. Bernstein has attributed the middle class child's advantage to special properties of the elaborated code. The more elaborate syntax of this code is said to be suited to a facilitation of the encoding of abstract and complex ideas. However at the age of five none of these subtle syntactic aspects of the elaborated code would be apparent as syntactic development is not sufficiently advanced. I suggest that at five years the middle class child may have an advantage nonetheless, because he has two codes rather than one. For either the bilingual or the middle class child having two codes may facilitate his awareness that there are different ways to say the same thing. This in turn may facilitate a decline in seeing names as a part of the things which they name, a characteristic of thought which Piaget (7) attributes to childhood egocentrism.

The notion that the two codes of a middle class child are similar to the two languages of a bilingual lower class child is supported by Fishman (4) who argues that bilingualism which is situation specific (bilingualism with diglossia) may appear in "speech communities whose linguistic diversity is realized through varieties not yet recognized as constituting separate languages." This is much like arguing that Bernstein's middle class children were actually bilinguals with diglossia and suggests that there might be comparable advantages from the two sorts of codes found in the lower class bilingual and in the middle class monolingual child.

The present study attempts to show that in bilingual five year olds there are advantages that would be expected from their having two languages: in object constancy, in naming, and in the use of names in sentences. Secondarily, it is suggested that object constancy should be in advance of naming, as Piaget suggests, and that naming should be in advance of using names in sentences.

Method

Subjects

The subjects were fifteen bilingual and fifteen monolingual Head Start children. The bilinguals were primarily of Mexican origin. Approximately half of the monolinguals were Negro and half of them of

Approximately half of the monolinguals were Negro and half of them of Mexican origin. The children lived in the same neighborhood and were enrolled in the same classes.

The bilinguals were selected by asking classroom teachers and a special language teacher to identify bilinguals. To be classified as bilingual, children had to demonstrate understanding of several simple Spanish questions and to speak Spanish at home. These criteria meant that several children whom the teachers classified as bilingual on the basis of Spanish surnames were here considered to be monolingual.

The children were four, five and six years of age with a mean age of five years. There were the same number of male and female children at each age in each group.

Procedure

The children were taken to a room removed from the classroom and were told that they were going to play a "candy game." They were given candy non-contingently at the beginning of the session, during breaks between the main sections, and at the end of the experiment. The experimenter was seated in front of a table on which he variously placed the toys that were being named.

1. Object Constancy

In the first part of the procedure each of several objects (cup, plate, sponge, etc.) was physically transformed. The transformations

were that a cup was crushed, a paper plate was spray painted, a sponge was dirtied, a match was burned, and a suction cup soap holder was adhered to a wall so that the child saw it sideways and straight on. The transformations were done in view of the child and then the transformed object was placed with a second object identical to the pre-transformed object. The child was asked, "Which was the one that I showed you before?" and was required to pick one object from the pair.

2. Naming

In the second part of the procedure, the child was told that he was going to play the "name game." The experimenter pointed out that objects, just like people, have names. The purpose of this section was to test the child's ability to use verbal labels to name familiar objects which were present. Three kinds of labeling ability were tested: The ability to use common names (i.e., call a cup "cup"), the ability to learn nonsense names (i.e., call a cup "wug"), and the ability to switch common names (i.e., call a cup "plate"). For each of these the subject was required in some cases to demonstrate his knowledge by speaking (production) and in other cases by pointing (comprehension).

The subject was presented with pairs of familiar toy objects (car, airplane; frog, lamb; monkey, squirrel). The experimenter switched the names of the objects in the pair (e.g., by holding up the

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car and saying "The name of this is 'airplane'"). The subject was asked both which object was called an "airplane," and which one was really an airplane. A similar procedure was followed in relabeling objects with nonsense syllables (e.g., "wug," "niss;" (1)) and asking which one was called a "wug" and what it really was.

3. Sentences

In the third part of the experiment, the child was required to demonstrate his ability to use the three sorts of labels described in part two (common, switched common, and nonsense labels) in simple relational sentences like "The cup is on the plate," by placing objects in a relationship stated by E and in other cases by describing the relationship in which E placed them. The labels used in the sentences were "cup," "plate," "can," "car," and "airplane" and the objects that were named were presented.

The rationale for using simple relational sentences was that referential word meaning, which can account for most of the meaning in these sentences, is the simplest sort of meaning and earliest to emerge. The notion is that such words as "table," "cup" get their meaning by standing for or referring to a thing. Simple relational sentences are syntactically simple and semantically simple since most of the meaning of the sentence can be conceived of as lying in the referential meaning,

of the component words. Words like "cup," "plate," and even the verb part of the predicate "on" can all be thought of as referring to things or states of the world.

Results

The results were analyzed in terms of the number of correct responses. The results were first analyzed by looking at performance of the two groups of subjects in the three sections of the experiment (Table 1). The range of performance of the three tasks (bilingual: 94-54 per

Insert Table 1 here

cent, monolingual: 84-35 per cent) suggests the appropriateness of the tasks for the age tested. The three tasks: object constancy, naming, using labels in sentences were increasingly difficult in the order expected. That is, both bilinguals and monolinguals found object constancy easier than naming, and naming easier than the use of names in a sentence.

Bilinguals did significantly better than monolinguals at all three tasks. The apparently uniform advantage that appears in this analysis will be seen in later analyses not to actually exist, but it would otherwise raise serious questions about the legitimacy of comparing the two groups.

As a post-hoc analysis the results in Table 1 were split for both subject groups within each task into verbal or production and pointing or comprehension responses (Table 2). I call the pointing responses com-

Insert Table 2 here

prehension measures because the subject had to understand what E asked him to point to. I chose this terminology because it implies that the underlying knowledge is the same in the two procedures and only the nature of the performance is different. There were only comprehension measures in the object constancy task, which was intended to be as purely cognitive as possible. Performance in equivalent tasks was broken down into comprehension and production for parts two and three of the experiment. In every case bilinguals did better than monolinguals on the comprehension measures. However, in parts two and three where there were also production measures, bilinguals did better one time (part three) but not the other (part two). It appears that the bilinguals' advantage in these tasks is most evident in comprehension measures.

In general, comprehension scores were superior to production scores for both groups (bilinguals: 80 per cent vs. 63.7 per cent; monolinguals: 65 per cent vs. 54 per cent; Table 3). This is interesting because it corroborates a notion common in the psycholinguistic literature;

Insert Table 3 here

namely, that comprehension tends to be in advance of production in language development. Comprehension may be more reliable for looking at these processes largely because the subjects are so young.

Table 1 shows that we found the tasks appropriate for five year olds, tasks one through three increasingly difficult for both groups, and bilinguals better than monolinguals at all three tasks. In Table 2 we found that the bilinguals' advantage over the monolinguals was more apparent in comprehension than production measures, and that comprehension was generally better than production (Table 3).

It is not until well past the age of five that children understand sentence meaning, but there may well be precursors to their understanding sentence meaning. These might logically emerge around five years. I suggest that the precursor state to the adult concept of sentence meaning would be the child's understanding that meaning is a function of use. A child could clearly demonstrate this understanding by his use of words in a sentence. He could also demonstrate it by his ability to switch names. While he might be able to learn common labels, and still think that names are parts of things, his willingness to rename things implies that he knows that the meaning of a word is just what a person uses it to mean.

In parts two and three there were three kinds of labeling tasks which we will now separate (Table 4): (1) switched common labels; (2) common, correct labels; and (3) nonsense labels, which were used in two sorts of situations: (A) alone as a label, and (B) in a sentence.

Insert Table 4 here

As would be expected from Table 1, the ability to use names as labels (A) is in advance of the ability to use the names in relational statements (B) in both bilinguals and monolinguals. Further, it is found that task 1 is harder than 2 and 1 is harder than 3. That is, in general switching names is harder than either using ordinary names or learning new nonsense names (Table 5). This is true for both the monolingual and bi-

Insert Table 5 here

lingual subjects and for both task types A and B with a single exception: monolinguals do so poorly at using both switched names (13 per cent) and nonsense names (16 per cent) in sentences that there is no difference between the two measures.

The most interesting findings lie in the contrast between the bilingual and monolingual groups (Table 4). Here it is clear that the bilinguals are not just generally superior to the monolinguals. In tasks

2A, the use of common names alone, and 3A, the use of nonsense names alone, the subject groups are equally competent. However, the bilinguals are better than the monolinguals in the use of these same names in relational statements (2B and 3B). Task 1, switching names, was found to be generally more difficult for both groups than tasks 2 or 3. The use of switched names as labels was superior in the bilinguals but the use of these names in a sentence was so poor in both groups there was no difference between them.

Discussion

First, why should the ability for both monolinguals and bilinguals to use names as labels be in advance of the ability to use them in statements? It seems intuitively reasonable that one has to learn how to use the labels as such before one can use them in a more complex structure like a statement. Although this is consistent with Piaget's notion, there is a twist obtained here. It appears that the ability to use names as labels has to reach some threshold level before the child is able to use them correctly in relations any significant percentage of time. Hence, in task 1 where labeling is correct only about 60 per cent (bilinguals) and 30 per cent (monolinguals) of the time, the use of labels in relations is correct close to 0 per cent of the time. Whereas in tasks 2 and 3 where labeling is correct around and above 85 per cent of the time, in

three out of four cases (except in 3B) labels are used correctly in relations a significant percentage of time (around 50 per cent). It appears tentatively that labeling has to consolidate before use in sentences of those labels can occur and not simply that labeling is a precursor function.

It may not be the case that labeling is important because it is a basic and paradigmatic function but because until it occurs and consolidates, other language functions, which are different in kind from labeling, cannot occur at all. The fact that there is an apparent ceiling effect rather than co-variation supports the notion that labeling may be necessary for later language functions but different in kind from them.

The second set of findings involves the difference for both groups obtained between task 1 and tasks 2 and 3. Changing a label is harder than knowing a correct one, or learning a new one. One can argue that around this age children are rapidly acquiring new words and, hence, are receptive to learning nonsense words which may be perceived as new labels by the child. However, five year old children are rigid in being unwilling to give up what they have already learned as it is such a recent and tenuous acquisition. On another level one may suggest the unwillingness to switch names represents an inability to see language meaning as a function of the speaker's use of the word, an inability to see that the name of a thing is just what a speech community chooses to call it.

Bilinguals then are superior in their ability to switch names used alone and also in the use of common names and nonsense names in relational statements. The ability to use names in statements clearly involves some ability to see language as usable by people in linguistic contexts. Similarly an ability to switch names may be said to require a notion of meaning as use; whereas, the ability to know names and to learn new ones is possible for a child who thinks names are a part of things and has no notion of use.

Naming is subject to two possible interpretations. The first is that names get their meaning by standing for or referring to objects. The second is that they are like all other language functions in depending for their meaning on use.

Hence, I am proposing that naming is important because it is the first place that the child learns that language meaning is related to use. Until he has naming mastered at a fairly high level, he cannot switch from the first gear of name meaning as reference to a second gear of name meaning as a function of use. Naming is nonetheless important because it appears that a certain threshold level of success at naming is required before the child can develop his first true language function, a notion of meaning as use.

The advantage of the bilingual child in switching names and using labels in sentences can be taken as evidence for a notion of meaning as

a function of use. This advantage is not identical to an ability to use names as labels for in their acquisition of common names and their ability to learn new nonsense names, the bilinguals and monolinguals are equal. The threshold effect observed further suggests a difference in kind between naming ability and a notion of meaning as use. I am suggesting then that the mere presence of two language codes as in the case of a lower class bilingual, or perhaps a middle class monolingual, facilitates the shift from a notion of meaning as word reference into seeing meaning as a function of use which I believe to be the precursor to an adult meaning system.

Summary

Monolingual and bilingual five year old Head Start children were compared in their ability at tasks involving object constancy, naming, and the use of names in sentences. The three tasks constitute a natural sequence of language skills. They were all found easier for bilinguals than monolinguals, and this was clearest on non-verbal measures. In a further analysis, it was found that switching names and using names in sentences was better in bilinguals but the knowledge of names and facility for acquiring new names was equivalent in the two groups. It was suggested that young children might first perceive names as attributes of things they name. With such a notion they might nonetheless

easily learn new words. However, they later learn that names refer to the things they name because someone so uses them. Having a notion of meaning as a function of use might facilitate acquisition of the ability to use labels in sentences.

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Table 1

The Per Cent of Correct Responses on Three Tasks: Object Constance, Naming and Use of Names in Sentences in the Monolingual vs. Bilingual Subjects

		Bilinguals % Correct	Monolinguals % Correct	t	p<
1--Object constancy		94.7	84.0	1.71	.05
2--Object relabeling		80.7	69.1	1.93	.05
	t	1.81	1.74		
	p<	.05	.056		
2--Object relabeling		80.7	69.1	1.93	.05
3--Relations		54.1	35.6	2.42	.025
	t	6.59	6.46		
	p<	.001	.001		

Table 2

The Mean Number of Correct Comprehension and Production Responses for Each of the Three Tasks and the Two Groups in Table 1

	Bilinguals $\bar{X}$	Monolinguals $\bar{X}$	t	p<
1--Object constancy				
A--comprehension	4.73	4.20	1.71	.05
B--production	---	---	---	---
2--Object relabeling				
A--comprehension	12.20	10.07	2.39	.025
B--production	3.13	3.07	---	N.S.
3--Relations				
A--comprehension	2.27	1.33	1.81	.05
B--production	2.60	1.87	2.21	.025

Table 3

Percentage of Correct Responses of Monolinguals vs. Bilinguals on Questions Requiring Verbal and Non-Verbal Responses

	Bilingual (%)	Monolingual (%)
Comprehension	80.0	65.0
Production	63.7	54.8

Table 4

Percentage of Correct Responses with Three Kinds of Labels (1, 2, & 3) Used Alone (A) and in Sentences (B) in Bilingual and Monolingual Subjects

	Bilingual %	Monolingual %	t	p<
1--Switched common label				
A--used alone	68.8	31.1	3.37	.005
B--in a sentence	6.7	13.3	---	N.S.
t	7.29	1.89		
p<	.001	.05		
2--Regular common label				
A--used alone	85.9	85.2	---	N.S.
B--in a sentence	73.3	52.0	2.18	.025
t	3.42	4.23		
p<	.005	.001		
3--Nonsense label				
A--used alone	91.1	93.3	---	N.S.
B--in a sentence	53.3	16.7	3.22	.005
t	3.45	10.69		
p<	.005	.001		

Table 5

Percentage of Correct Responses of Bilingual and Monolingual Subjects Comparing Three Kinds of Labels: (1, 2, & 3) Used in Two Kinds of Tasks: Alone (A) and in Sentences (B)

	A		B	
	Bilingual %	Monolingual %	Bilingual %	Monolingua %
1--Switched common label	68.8	31.1	6.7	13.3
2--Regular common label	85.9	85.2	73.3	52.0
t	2.36	6.35	9.85	5.06
P<	.025	.001	.001	.001
1--Switched common label	68.8	31.1	6.7	13.3
3--Nonsense label	91.1	93.3	53.3	16.7
t	3.88	4.77	5.11	.23
P <	.001	.001	.001	N.S.